Space Weather Forecast

Issued on Tuesday, 14 February 2023 at 12:23 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Further M-flares (R1/R2 Radio Blackouts) likely, with a slight chance of isolated X-flares (R3 Radio Blackout). Slight chance of G1/Minor Storm on Days 1 and 2 (14-15 Feb).

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity was Moderate during the period, with two low-level Moderate-class flares, both originating from a larger region in the northeast. There are currently 12 sunspot regions on the visible disc. The most noteworthy region is the one in the northeast, which has continued to mature after rapid development, and may contain a magnetically complex spot although limited imagery makes this difficult to assess at present. However, there are also two larger regions approaching the northwest limb. One of these has been a source of flaring but is now rotating off the disc and is no longer fully visible. The other, although moderately sized, has been fairly stable. The region which was the source of a Strong flare on the 11th, has now faded significantly. Other regions appear relatively small and simple at present.
No Earth-directed Coronal Mass Ejections (CMEs) have been observed in available imagery during the last 24 hours. A CME seen recently in imagery travelling northeast is unlikely to be Earth directed.

Solar Wind / Geomagnetic Activity: There has been an outage of solar wind data since 13/2330 UTC. However, a weak CME arrival was observed starting around 13/1705 UTC. Wind speeds were at ambient levels, varying between 330-370 km/s. The total Interplanetary Magnetic Field was weak but jumped slightly as the CME arrived. The north-south component varied weakly Geomagnetic activity was Quiet (Kp 0-2). After 13/2330 UTC, it seems likely that largely ambient conditions continued, perhaps with some continuing weak CME effects, as the geomagnetic activity remained Quiet.

Energetic Particles / Solar Radiation: The count rate of energetic particles was at background levels with no solar radiation storms observed.

Four-Day Space Weather Forecast Summary

Solar Activity: Solar activity is likely to be Moderate, with a slight chance of becoming High with any Strong flares.

Solar Wind / Geomagnetic Activity: Earth has experienced weak CME effects recently. There is also the possibility of a further weak CME giving a glancing pass later on Day 1. Otherwise, there are no significant coronal holes in the forecast at present, so the solar wind speed is likely to remain at largely ambient levels. There is the possibility of a weak fast wind pushing wind speeds to slightly elevated levels on Day 4, but with low confidence.
Geomagnetic activity is therefore expected to be mainly Quiet to Unsettled, perhaps rising to Active to G1/Minor Storm on Days 1 and 2 with any weak CME effects, and perhaps Active on Day 4 if we see a weak HSS.

Energetic Particles / Solar Radiation: The count rate of energetic particles is expected to remain at background levels, but there is a slight chance of exceeding the S1/Minor radiation storm level in response to any significant flares that occur.

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	10	5	1	1
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	Yes	60	60	50	50
Very Active	R3 to R5 X	No	10	10	10	10

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	15	15	10	5
Very Active	≥ S3 *	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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